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Patient's Perception and Real Execution of Walking as Physical Exercise: Looking at Self-Efficacy as a Key Variable in Adherence in Patients with Fibromyalgia

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Abstract: Adherence to physical exercise is especially low in patients with fibromyalgia, and there is a tendency to overestimate its performance. This study explores the relationship between perceived and actual walking behavior in patients with fibromyalgia, including self-efficacy as a mediating variable. A prospective study with two time points (with one week between them) was carried out on 132 women diagnosed with fibromyalgia. Self-efficacy towards exercise was assessed at the first time point, and perceived intensity of physical activity and "objective" walking amount (accelerometer) in relation to the previous week were assessed at the second point. Physical and emotional symptoms and the consumption of drugs were also evaluated as covariates. The results show that perception of vigorous-intensity exercise was related to walking (accelerometer) (effort greater than 6 METs). This relationship was explained by the mediating effect of self-efficacy and was not interfered with either by the symptoms or by the consumption of drugs. High self-efficacy regarding physical exercise was directly related to walking behavior despite patients' interpretation of this activity as a vigorous physical exercise. In intervention and rehabilitation programs, it would be interesting to take into account and promote the self-efficacy of patients in relation to physical exercise in order to maintain adherence to walking.

Keywords: fibromyalgia; walking; self-efficacy; perception of walking; accelerometry; mediation analysis

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1. Introduction

Approximately 3% of the Spanish population suffers from chronic pain problems, with fibromyalgia (FM) being particularly relevant because of its differential characteristics. Fibromyalgia is more common in women than men, with females accounting for 80% of diagnoses nationwide [1]. This somatic syndrome is characterized by the unexplained presence of widespread musculoskeletal pain along with intense fatigue. Both symptoms may be accompanied by additional symptoms such as sleep disturbances, anxiety, depression, or problems with functionality [2]. Regarding data collected worldwide, between 2% and 4% of people with chronic pain are diagnosed with fibromyalgia [3,4], making it an important public health problem in which helping people to successfully cope with their pain or fatigue remains a relevant goal for healthcare professionals and researchers.

For people with FM, a particularly important threat to their quality of life is symptom interference, understood as the perception of how pain or fatigue interfere with the performance of other daily activities, significantly limiting successful adaptation to the symptoms [5]. Therefore, a multidisciplinary approach should not only include pharmacological therapy, but other types of therapeutic resources that help alleviate emotional distress and increase the rewards derived from engaging in meaningful activities versus avoiding activity to reduce pain or other symptoms, such as fatigue [5]. Sedentary behavior

has recently emerged as a strong risk factor fin the development of future chronic diseases in healthy individuals reporting low levels of perceived pain [6]. Moreover, after the COVID-19 lockdowns, stress levels have potentially increased sedentary activity globally, which has conditioned the development of rehabilitation programs adapted to the reality faced by patients with chronic pain [7]. Several studies have pointed to the role of physical activity as a resource that can aid in the improvement of pain, fatigue, stiffness, and functional levels, as well as enhance positive emotional states through the reduction of anxiety and depression [8–10]. Multimodal physical exercise interventions have focused on aerobic conditioning, as it can decrease the risk of potentially painful injuries in patients' daily lives [11,12]. Specifically, it appears that moderate-intensity aerobic physical exercise improves pain and fatigue thresholds [9,13,14]. In this context, telerehabilitation has been an innovative scenario in face of the COVID-19 pandemic and has generated similar benefits to face-to-face therapeutic protocols that were implemented before the pandemic [15], providing support to care services for chronic populations. As such, it should be taken into account to improve patients' quality of life [16].

However, despite the reported benefits, there are also potential barriers to adherence to this type of treatment in this population, including the interference of the above-mentioned symptoms. The paradoxical effect of symptoms on physical exercise in patients with chronic pain has been widely reported in the literature, and, although moderate aerobic physical exercise alleviates symptoms in the mid–long term, at the same time said symptoms are the main inhibitor for the initiation and maintenance of physical activity, especially during the initial phases [8,17,18]. Therefore, one explanation for the lack of adherence lies in the difficulties that patients find when reducing their sedentary lifestyle due to an increase of symptoms occurring when physical activity is performed at too high a pace and/or without professional supervision [11,19,20]. Another potential barrier to adherence to physical activity among chronic pain patients may reside in the incompatibility of physical exercise programs with patients' daily routines; in fact, most physical fitness programs require numerous visits to specialized clinics, explaining a dropout rate of approximately 40% [14]. Taking the above into consideration, walking offers greater advantages than other types of high-intensity physical exercise, such as: self-regulation of the pattern itself, low economic cost with minimal interference in normal routines, and relying exclusively on the motivation of the patient [21]. Furthermore, walking appears to be the pattern that most increases perceptions of self-efficacy in terms of managing FM-related problems (e.g., pain, fatigue, or disability). However, considering the sedentary tendencies of the FM population [22,23], it is especially important to recommend initiating walking gradually and regularly [24]. Specifically, based on the recommendations outlined by various chronic pain professionals, walking for at least 60 min in bouts of 20 min with a small rest between bouts, four times a week, over a minimum of six consecutive weeks [25] is recommended, and has been shown to have beneficial effects on long-term health [25–27].

In summary, it is important to analyze walking within the context in which it occurs. This means taking into account patients' symptoms, perceptions about the intensity of the activity, and beliefs regarding their own abilities to walk as a form of physical exercise. In support of this idea, previous research has pointed out the lack of agreement between patients' perceptions and actual exercise performance; because patients with FM often consider light–moderate activities as intense, complete physical recovery becomes impossible, and they abandon the goal [28,29]. Therefore, most clinical research highlights the need for instruments that include both objective and subjective measures of activity, specifically in relation to exercise intensity and capacity [30,31]. One of the most used questionnaires to assess perceptions of activity in FM is the abbreviated version of the International Physical Activity Questionnaire (IPAQ-s) which records time spent performing physical activities as a function of intensity (moderate, light, walking and sitting time). Recent research suggests that the IPAQ-s information must be used to support measures offered by other assessment instruments such as accelerometers [32,33]. The latter type of instrument allows for the monitoring of energy expenditure and directly measures specific behaviors based

on intensity, body posture, or counts of the amount of physical activity performed [34]. These types of measurement devices employ metabolic rate measurement units (METs) that attempt to analyze the amount of energy consumed by a person at rest. Thus, 1 MET corresponds to 3.5 mL O_2/kg per minute, which is the minimum amount of oxygen consumption that the body needs to maintain itself. Based on this unit of measurement, the type of physical exercise is differentiated according to its intensity measured in METs: light or gentle exercise has an energy expenditure of 3 METs; light–moderate exercise expends between 3–6 METs and vigorous or intense exercise more than 6 METs [35]. In patients with fibromyalgia, accelerometry is frequently used to assess physical activity in view of the benefits of exercise in this population [10,36,37]. In support of previous research, the first objective of this study has been to compare the measures provided by the IPAQ-s as a subjective measure of the intensity of the activity performed, and the measures provided by the accelerometer whilst walking.

Regarding beliefs about one's own abilities to walk as a form of physical exercise, self-efficacy—understood as the set of all knowledge that people have about their abilities and confidence to achieve a goal or cope with a situation—plays an important role in the physical function of patients suffering from chronic pain [38,39]. In addition, it promotes the positive emotional states necessary to initiate physical exercise [40]. However, the association between perceptions about physical activity and objective walking behavior has not been examined whilst taking into account the effect of beliefs regarding patient abilities and their possible interference with core symptoms such as pain or fatigue or the effects of medication [41]. Therefore, the second main objective of our research aimed to examine the relationships between subjective and objective measures of walking behavior and self-efficacy from a simple mediational model (taking self-efficacy as a mediator variable). To this end, the intention has been to previously control for the possible effects of FM symptoms (i.e., pain, fatigue, sleep or cognitive problems, anxiety, and depression) and medication.

In particular, we hypothesized an overestimation of the intensity of the physical activity performed in comparison to the walking measurement provided by the accelerometers. Likewise, we expected self-efficacy to play a significant mediating role in the performance of walking behavior based on said overestimation of the activity. Fibromyalgia symptoms and drug use were expected to affect the overall model (greater drug use and greater symptoms will have an impact on less walking behavior).

2. Materials and Methods

2.1. Participants and Procedure

The research protocol of the present study was reviewed and approved by the Bioethics Committee (Universidad Rey Juan Carlos, Madrid, Spain, Reference 160520165916, date of approval 9 June 2016). The study followed the ethical guidelines of the Declaration of Helsinki.

Different fibromyalgia associations in the Community of Madrid and Castilla La Mancha (Spain) were contacted. All patients interested in participating had to be women over 18 years of age, be diagnosed with fibromyalgia according to the criteria established by the American College of Rheumatology (ACR) [2], have a prescribed walking pattern, show no impediments to physical activity, and sign the informed consent form. The exclusion criteria that were established to carry out the study were the presence of other comorbid chronic pain diagnoses or severe psychiatric diagnoses. The final participant sample consisted of 132 women.

Regarding data collection in this prospective study, sociodemographic, clinical characteristics (including medication) of the participants and self-efficacy were evaluated first. After the evaluation, an accelerometer was provided to be worn on the wrist for one week. Patients were instructed not to remove the accelerometer except for aquatic activities such as showering or swimming. The final assessment was conducted one week later, when the accelerometers were collected. Perception of physical activity and symptoms (pain, fatigue,

unrefreshing sleep, cognitive problems, anxiety and depression) in the previous week were also assessed at this point.

Both self-reports and accelerometer data were collected within the associations. All members of the research team carried out the evaluations. The data were downloaded to a computer and processed with the manufacturer's software.

2.2. Measures

2.2.1. First Assessment

Sociodemographic and clinical data. An interview was applied with open-ended questions that the participants had to answer regarding their age, weight, height, marital status, employment status, educational level, and clinical aspects such as the use and type of medication.

Self-efficacy about physical exercise in chronic pain. Self-efficacy related to physical activity was assessed using the Spanish adaptation of the Self-efficacy scale for physical activity scale for chronic pain (SEPAS) [42]. This adaptation reports on the sedentary lifestyle of women with fibromyalgia, physical activity intensity levels and walking pattern recommendations [43] attending to 5 barriers: pain, fatigue, bad weather, feeling stressed, sad, worried, and having a bad day because of fibromyalgia. The SEPAS is composed of 35 items grouped into 3 factors depending on the intensity of the physical exercise performed. For this study, the self-efficacy subscale related to walking while taking advantage of doing other activities was used, which is made up of 5 items that ask about the ability to perform walking related to daily activities despite the aforementioned barriers (e.g., "I feel able to walk at least 30 min, taking advantage of having to do other activities (walk the dog, go to work or shopping) yet (a) I have pain, (b) I have fatigue, (c) There is bad weather, (d) I feel sad, stressed or worried, (e) I have a sick day"). In our sample, the walking self-efficacy subscale showed an internal consistency of 0.85.

2.2.2. Second Assessment

Walking, moderate, and vigorous physical activity (subjective measure). The abbreviated version of the International Physical Questionnaire (IPAQ-s) was used to assess the physical activity performed in the previous week according to the level of intensity (moderate, vigorous intensity, and walking) [44]. Following the instructions, the time measures recorded by the self-report are: days per week, minutes per week, and minutes per day for each type of intensity. Some examples of items are the following: "During the last 7 days, on how many days did you do moderate physical activities such as carrying light weights, bicycling at a regular speed, swimming, or dancing? (Do not include walking)"; and "How much time in total did you usually spend in moderate physical activity on one of those days?" For a correct interpretation of the possible relationships between the intensity levels provided by the IPAQ-s and the intensity levels provided by the accelerometer, the minutes/week results were used for each intensity level.

Walking (objective measure). The ActiGraph wGT3X-BT (Pensacola, FL, USA) was used to record total physical activity in minutes per day and intensity. According to studies in chronic pain populations, episodes of 20 continuous minutes with intensity 0 are excluded from the analysis because it is considered sedentary activity. Time spent walking is considered a moderate-intensity activity and was consequently defined as minutes accumulated between 100 and 759 counts—min-1 [34].

2.2.3. Covariates

Medication. A high percentage of women diagnosed with FM take medication to alleviate symptoms such as pain or fatigue and allow for restful sleep [45,46]. In line with the previous literature, we asked about the number of pills taken per day according to the type of medication: analgesics, sleeping pills, antidepressants and muscle relaxants.

Pain. Pain intensity was measured by the Brief Pain Inventory (BPI) [47]. In particular, the BPI item that refers to the mean intensity of pain experienced during the past week

(on a numerical scale ranging from 0—"no pain"—to 10—"greatest pain imaginable"—) was used.

Fatigue, unrefreshing sleep, and cognitive problems. Fatigue intensity, non-refreshing sleep and cognitive problems in the last week were measured by 3 independent items assessing the severity index of symptoms on a 4-point Likert scale (0—"no problem", 3—"severe, persistent, pervasive, with interference in daily activities").

Anxiety and depression symptoms. Anxiety and depressive symptoms were evaluated by the Spanish validation of the Hospital Anxiety and Depression Scale (HADS) [48]. This instrument provides information on the presence of these symptoms in non-psychiatric patients and is made up of 14 items (on a 4-point scale) that are divided (7 items each) into a scale that evaluates anxiety symptoms (e.g., "I feel tense or nervous", "I feel a kind of dread as if something bad is going to happen") and another scale to measure depression symptoms (e.g., "I feel slow and clumsy", "I have lost interest in my personal appearance". In our sample, the internal consistency was 0.70 and 0.72 for the anxiety and depression scale, respectively.

2.3. Data Analysis

The analyses were carried out using SPSS 27.0 (Armonk, NY, USA) and the level of significance was set at $p = 0.05$. The characteristics of the sample were described with frequency distributions, percentages, means, and standard deviations.

First, we explored the possible relationships between the perception of different levels of intensity on physical activity performed by the participants, accelerometer-reported walking behavior, and self-efficacy to perform physical activities using Pearson's correlation analysis.

Finally, we intend to specify the roles of each of the study variables by proposing more complex statistical models. Based on the previous literature, we proposed a simple mediation model in which the subjective measure of the level of intensity (variable X) predicted the time spent walking referred by the accelerometer (variable Y). We considered that this relationship could be influenced by self-efficacy for physical activity (variable M) as can be seen in Figure 1. To test this model, we used model 4 (simple mediation model) of the PROCESS 3.5 macro controlling for the effect of medication, pain, non-restorative sleep, fatigue, cognitive problems, and anxiety and depression symptoms as covariates of the simple mediation model. According to the criteria established by Hayes [49], the variables posed in the model must correlate significantly ($p < 0.05$). The bootstrap technique was used to control the type I error in the sample with a 95% confidence interval. The bootstrap estimates were based on 5000.

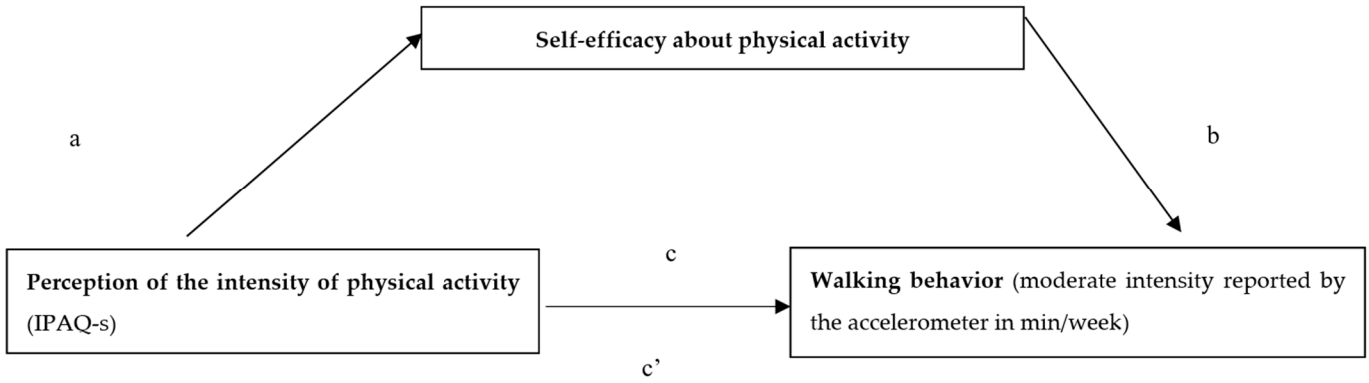


Figure 1. Proposed simple mediation model. Coefficient a is the effect of predictor on outcome; coefficient b is the effect of mediator on outcome; coefficient c is the total effect of predictor on outcome; c' is the indirect effect that are represented as the effect of predictor on outcome.

3. Results

A total of 158 patients completed the first assessments of the study. However, 132 women completed the subsequent assessments after wearing the accelerometers for one week. Descriptive statistics of sociodemographic and clinical data are presented in Table 1.

Table 1. Sociodemographic and clinical data of participants.

FM Participants (n = 132)						
Sociodemographic Data	***n***	**(%)**	**M**	**(SD)**	**Max**	**Min**
Age			57.63	10.44	79	32
Marital status						
Married	95	(72.4)				
Divorced or separated	13	(9.8)				
Widow	11	(8)				
Single	13	(9.8)				
Educational level						
Primary studies	89	(66)				
Secondary studies	31	(24.6)				
University studies	12	(9.4)				
Employment status						
Working	30	(22.7)				
Housewife	66	(50)				
Sick leave	15	(11.4)				
Unemployed	21	(15.9)				
Clinical data			*			
Medication						
Analgesics						
Yes	104	(86.7)	4.37	2.54	5	0
No	28	(13.3)				
Sleeping pills						
Yes	77	(65.9)	3.20	3.30	3	0
No	55	(34.1)				
Antidepressants						
Yes	78	(66.7)	3.67	3.31	2	0
No	54	(33.3)				
Muscle relaxants						
Yes	49	(31.9)	1.27	0.55	4	0
No	83	(68.1)				
Others						
Yes	74	(55.4)	1.20	0.41	6	0
No	58	(44.6)				

Note: M (Mean); SD (Standard Deviation); * data collected on the type of medications is number of pills per day.

3.1. Aim 1: Associations between Subjective Measures of Physical Activity Intensity (IPAQ-s) and Objective Measure of Walking (Accelerometer)

As shown in Table 2, walking behavior recorded by the accelerometer was positively associated with the perception of activity as vigorous (r = 0.765, p = 0.000). Self-efficacy was positively related to the perception of moderate- (r = 0.324, p = 0.001) and vigorous-intensity (r = 0.258, p = 0.007) IPAQ-s activity and to walking recorded by the accelerometer (r = 0.213, p = 0.026).

In relation to symptoms, there was a negative significant correlation between the perception of moderate activity and depression (r = −0.217, p = 0.013). Similarly, there was a negative significant association between the accelerometer walking measure and both cognitive problems (r = −0.180, p = 0.040) and depression (r = −0.265, p = 0.002). Negative significant relationships were also shown between self-efficacy and pain (r = −0.272, p = 0.004), cognitive problems (r = −0.321, p = 0.001), and depression (r = −0.379, p = 0.000).

Table 2. Pearson correlations.

	Mean	SD	Min–Max	1	2	3	4	5	6	7	8	9	10	11
1. Walking (IPAQ-s)	3587.96 min per day	408.27	0–21,960	–										
2. Moderate activity (IPAQ-s)	131.66 min per day	55.76	0–2940	−0.034	–									
3. Vigorous activity (IPAQ-s)	40.73 min per day	20.61	0–2940	−0.038	0.720 **	–								
4. Walking (Accelerometer)	519.29 min per day	138.71	104.75–1045.75	0.051	0.017	0.765 **	–							
5. Self-efficacy physical activity	4.63 (a.u.)	2.31	0–10	0.156	0.324 **	0.258 **	0.213 *	–						
6. Pain	7.10 (a.u.)	1.83	1–10	0.086	0.082	0.021	0.046	−0.272 **	–					
7. Fatigue	2.29 (a.u.)	0.81	0–3	−0.041	−0.089	−0.058	−0.131	−0.174	0.056	–				
8. Sleep problems	2.60 (a.u.)	0.68	0–3	−0.005	0.018	0.056	−0.049	−0.147	0.261 **	0.185 *	–			
9. Cognitive problems	2.28 (a.u.)	0.82	0–3	0.064	−0.169	−0.084	−0.180 *	−0.321 **	0.250 **	0.260 **	0.150	–		
10. Anxiety	11.86 (a.u.)	3.86	3–21	−0.032	−0.060	−0.006	−0.104	−0.154	0.228 *	0.080	0.087	0.084	–	
11. Depression	9.46 (a.u.)	2.36	3–21	−0.119	−0.217 *	0.099	−0.265 **	−0.379 **	0.175	0.241 **	0.139	0.322 **	0.529 **	–

Note: * $p < 0.05$; ** $p < 0.01$; a.u. arbitrary unit.

Regarding the medication, the only significant relationships were found between analgesics (pills per day) and the perception of exercise as intense (r = 0.258, $p = 0.007$), and with self-efficacy (r = 0.212, $p = 0.025$).

3.2. Aim 2: Mediational Role of Self-Efficacy between Perception of Intensity of Physical Activity (Subjective Measure) and Walking Behavior (Objective Measure)

Based on the results obtained in the correlational analyses and according to Hayes' criteria [49] on mediational models, our predictor variable was the perception of intense physical activity, and our outcome variable was walking as a moderate-intensity activity (accelerometers). This finding is consistent with previous studies which indicate an overestimation by patients with fibromyalgia of the intensity of the physical activity that they carry out [28,29]. Based on this finding, we intended to analyze the possible role of self-efficacy in this relationship according to the theoretical model proposed in Figure 1. The proposed simple mediation model resulted in uniformly acceptable model fits ($R^2 = 0.286$). As hypothesized, perception of physical activity (vigorous) predicted the walking behavior registered by the accelerometer. Specifically, perceptions about the performance of intense physical activity were predictive of walking behavior (c′ = 5.10, $t = 1.01$, $p = 0.008$, 95% Confidence Interval (CI) = 0.081, 1.44). In addition, a significant effect of the perception of intense physical activity on self-efficacy was observed (a = 1.63, $t = 2.49$, $p = 0.014$, 95% CI = 1.04, 1.34), along with an effect of self-efficacy on walking behavior (b = 4.63, $t = 1.70$, $p = 0.022$, 95% CI = 1.93, 5.21). The relationship between the perception of intense physical activity and walking behavior was explained by the mediating effect of self-efficacy (c = 3.16, $t = 3.38$, $p = 0.004$, 95% CI = 2.85, 4.72). Of all the symptoms considered as covariates in the model, only pain (B = −0.31, t = 0.13, $p = 0.014$, 95% CI = −0.54, −0.064) and depressive symptoms (B = −0.19, t = −2.99, $p = 0.003$, 95% CI = −0.31, −0.065) influenced the effect of perception of physical activity on self-efficacy but did not explain the total effect of the mediation model. Regarding the type of medication, only analgesics (pills per day) had a mediating effect between the perception of intense physical activity and self-efficacy (B = −0.20, t = −2.23, $p = 0.027$, 95% CI = −0.37, −0.02). In other words, despite the main symptoms of fibromyalgia and the use of analgesics, the perception of carrying out an intense physical activity influenced objective walking behavior through the perception of self-efficacy (see Figure 2).

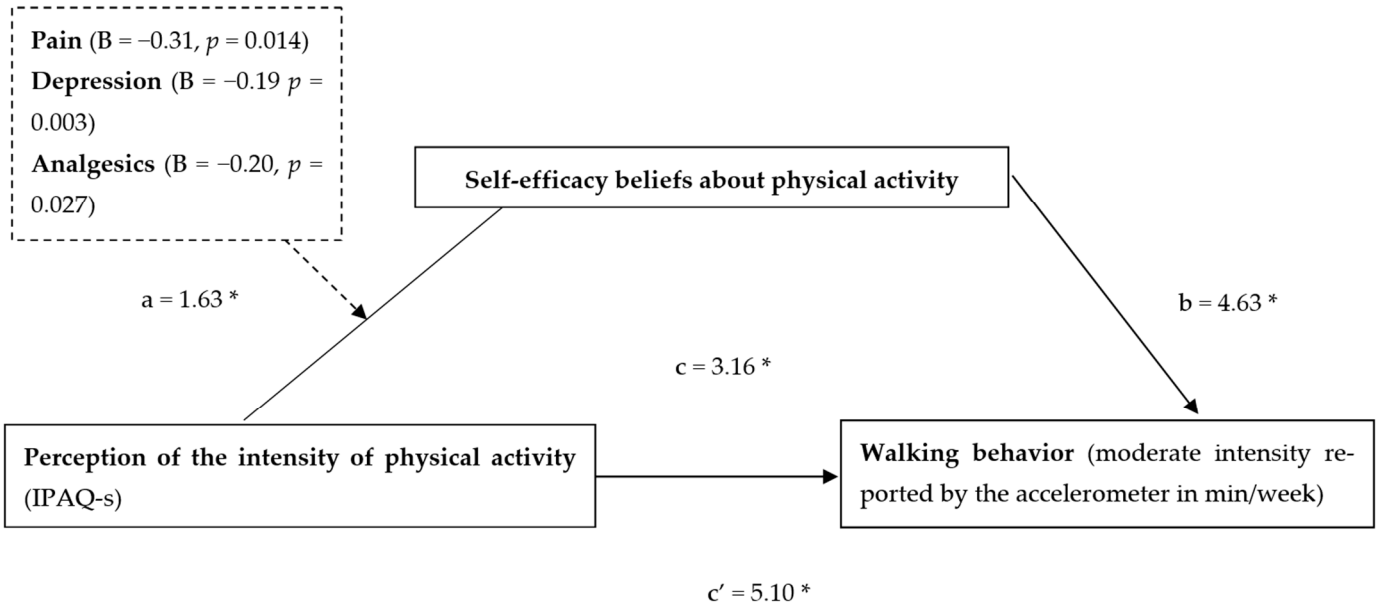


Figure 2. Paths between perception of physical activity (subjective measure) and walking behavior (objective measure) through self-efficacy beliefs about physical activity, controlling for symptoms and medication. Note * $p < 0.05$.

4. Discussion

In this study we used a simple mediational model to clarify the role of perceptions regarding walking held by women with fibromyalgia and the role they play in adhering to a pattern recommended as a way to decrease adverse symptoms. We found that although participants viewed walking as an intense activity, it was positively associated with objective walking through the influence of beliefs regarding their abilities about physical exercise (self-efficacy). Overall, the hypothesized model paths were supported, and model fits were uniformly acceptable. Based on the stability of the results found, the clinical implications of the present study are discussed below.

The first step we undertook was to explore possible mismatches between the subjects' perceptions of walking and the objective measures of their walking pattern. Our results clearly suggest a significant association between subjective measures of vigorous activity and the objective measure of walking. Although previous studies have reached the same conclusions with smaller fibromyalgia or chronic pain samples [50–53], our interest was also focused on determining which psychological and physical factors may explain the differences between subjectivity and observable performance in patients' walking behavior. On this topic, the previous literature on fibromyalgia shows that the discordance between assessment measures can be explained by problems in central pain processing. This fosters the persistent occurrence of chronic widespread pain, among other common symptoms of fibromyalgia such as fatigue and cognitive problems [54,55] along with the presence of anxious and/or depressive symptoms [28,29]. Therefore, we set out to explore the possible effect of physical and emotional symptoms on the association between the subjective (self-reported) and the objective (accelerometer-based) measures of walking.

The correlation results showed significant relationships between the measurements provided by the IPAQ-s questionnaire and the accelerometer. Specifically, of the two types of intensity provided by the self-report, it was the perception of intense activity that was significantly associated with walking, considering that the latter is a moderate-intensity activity following the indications of Gusi et al. [25] regarding physical exercise guidelines in fibromyalgia. These data suggest the suitability of both instruments for evaluating the physical activity of chronic pain patients, since it is not only the amount of exercise performed that is important, but the subjective vision that patients have about exercise as well. In this context, the perception of the intensity of a given activity could have a negative or positive impact on adherence to this guideline as part of the recommended treatment for fibromyalgia.

In view of the above, the following question may be asked: what factors influence women with fibromyalgia to perceive moderate activity as intense? According to the contributions offered by Jones et al. [31], the physical symptoms typical of the disease influence the patients' subjective evaluation of physical exercise. Even memory and attention problems have an impact on patients not remembering accurately the type of exercise they have performed [56], and therefore self-report measurements may be biased. Our results show that depressive symptoms correlate both with perceived moderate-intensity physical activity (IPAQ-s) and with the objective measure of walking (accelerometers), while in the latter case (accelerometers) the association with cognitive problems must also be included. Based on these preliminary analyses, the model we suggest considers these symptoms as possible factors influencing the predictive effect of intensity perception on objective walking behavior.

In line with our hypothesis, the perception of vigorous intensity in the activity predicted the walking pattern (accelerometers) carried out for a week. Despite the presence of adverse symptoms, these do not seem to explain the lack of activity in the participants as claimed by the fear-of-movement model of Vlaeyen et al. [57]. The central focus of this model lies in catastrophic beliefs about pain, which exacerbate pain intensity which, in turn, leads to avoidance of physical activity and thus contributes to greater disability [22,58,59]. Although the literature on the effects of fatigue is scarcer, this symptom has also been found to promote avoidance behaviors in women suffering from FM in previous studies [60,61].

Our results show that only pain and depression influenced the association between the perception of intensity and self-efficacy, but nevertheless there was no influence on the model as a whole (the model considers the association between the perception of intensity and walking—accelerometers—through self-efficacy); therefore, within the aforementioned model, the symptoms do not seem to have an influence on lower physical activity. Another factor that is indirectly associated with a decrease in time devoted to physical activity is the use of antidepressants, which consequently increases sedentary activity. In a study of people with severe mental illness, it was found that people medicated with antidepressants (SSRIs) are more sedentary than those who do not take them [62,63]. Our results indicate that only analgesics (and not antidepressants) negatively influenced the relationship between the perception of activity as intense and self-efficacy; however, they did not affect the model proposed in its entirety and therefore walking performance. It should also be noted that, globally, the lack of participation in physical activities is due to multiple factors, especially environmental influences. For example, the scarcity of parks, pedestrian paths, lack of sports and leisure facilities, or the use of cell phones correlate positively with a sedentary lifestyle [64,65]. Again, the environment in which people develop seems to have a strong influence on the decisions they make regarding exercise, so this is an issue that also needs to be resolved in studies dedicated to people with chronic pain.

Our results are supported by the findings offered by new affective-motivational models on pain [66,67]. These theories take context as a reference to understand that the relationship between catastrophic beliefs and activity avoidance is not direct, but rather, several factors come into play that show a preference for hedonic goals—aimed at avoiding the threat of symptoms—or for achievement goals when performing physical activity [68,69]. In this sense, it is cognitive and emotional factors that may mostly explain behavior beyond the effect of physical symptoms [29,70]. Many patients lack the confidence to exercise despite their symptoms and lack adaptive beliefs that exercise will help them manage their disease and improve their quality of life [71,72]. Along these lines, self-efficacy turns out to be an essential component for undertaking a new activity, as it provides the basis of motivation to start an exercise. Consistent with previous research that has studied the role of self-efficacy within the motivational context of chronic pain, our findings suggest that beliefs about ability regarding physical exercise play an important mediating role between patients' perception and the actual execution of walking. This is despite perceiving it as an activity of greater intensity, and taking into account pain, as a primary symptom of FM, depressive symptoms, and drug use (analgesics). Previous studies have also confirmed the mediation of self-efficacy in the results obtained in the management of pain catastrophizing and perceived pain control thanks to cognitive behavioral therapy [73]. In addition, self-efficacy, fibromyalgia tender points, perceived impact of illness, physical functioning, as well as reported long-term anxiety and depression, have all also been shown to be important predictors of objective pain [74,75]. Therefore, our findings suggest that feeling able to perform any physical exercise would dampen the effect of perceiving walking as intense and would help to successfully cope with fibromyalgia.

Regarding the potential clinical applications of the present study, we believe that focusing solely on reducing pain intensity would be an inadequate therapeutic goal. From a rehabilitative perspective, the most effective treatments for fibromyalgia are those that combine cognitive-behavioral therapy with graded physical exercise for each patient profile [9,54]. Following these guidelines, we consider it appropriate to work on promoting self-efficacy through motivational and volitional interventions that encourage a preference for achievement goals over hedonic goals based on pain/movement avoidance. Furthermore, our data tentatively suggest that a physical program is also effective with individuals in whom large differences exist between perceived intensity of physical exercise and target performance. This clinical approach makes sense if fear of injury is adequately addressed as a belief easily modifiable by ability; the minimization of such beliefs are also related to positive emotional states and to less symptom interference [76,77].

Despite its possible implications, there are limitations to this study that warrant some attention. First, it might be expected that the female volunteers who participated in our study felt more confident in performing physical exercise compared to the general population with fibromyalgia. Therefore, it would be interesting for future studies to also control for the role of catastrophizing as a possible behavioral inhibitor, as pointed out by the previous literature [59,78–80]. Another limitation is regarding the age of the participants, as the mean age was older than in other studies. A well-known age-associated health problem is cognitive decline, which we assessed using a single question with responses distributed on a Likert-type scale. However, it is possible that a single self-report item is not a valid measure to detect the appearance of certain cognitive problems that could be influencing the proposed mediational model. For this reason, it is important to control for this health problem as a possible covariate, and to try to assess it with other appropriate instruments. Furthermore, it seems that the discordance between subjective and objective measures about physical exercise is higher in women than in men with fibromyalgia [51,81], which in turn limits the generalization of the results obtained. Finally, our results indicate that the proposed model is not affected by the symptoms. However, symptoms such as fatigue have several dimensions that explain why this experience is unique to each patient [82]. Therefore, it would be important to assess physical fatigue and mental fatigue independently to explore their effect on this model. Along this line, we have included the effect of medication on the execution of physical activity and the perception of its intensity. Finally, as we have noted, women with FM tend to perceive greater activity and greater intensity than the exercise they have done. However, we do not know whether this result is confirmed in the healthy population. Therefore, we propose to resolve this question in future studies by replicating this model with the inclusion of a control group.

In summary, previous research on chronic pain from motivational perspectives such as the goals-conflict theory [69], emphasize the role of adaptive cognitions to take into account during the multidisciplinary treatment of fibromyalgia. In this context, our results highlight the role of self-perceived capacity beliefs (self-efficacy), through adherence to walking, in mitigating patients' dysfunctionality within the rehabilitative context.

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